Sampling Indoor Air Under Conditions that Maximize the Potential for Exceedence of Action Levels

Determining if there is an exceedence of an indoor air action level is difficult. There are inherent problems with sampling the indoor air and also with interpreting the results. For instance, it is easy to locate a sample in areas where the indoor air is not representative, such as where air is diluted by vents or air ducts. It is also easy to encounter elevated indoor air background levels of the contaminant that is being measured.

Therefore, it is often advisable to sample under conditions that are the most likely to show an exceedence, and also to provide an indication of the contaminant vapor in the soil or directly beneath the building. If sampling is conducted under these Aworst case@ conditions and there is no exceedence of action levels, then one can be reasonably sure that there is not an indoor air vapor intrusion problem. However, exceedence of an indoor air action level does not in and of itself indicate a vapor intrusion problem. The exceedence must be interpreted in view of the indoor air background levels and one must also verify that vapor exists below the structure. Vapor below a structure is a strong indicator that a Acompleted pathway@ exits.

There are two types of background associated with indoor air sampling; indoor air background and ambient background. Either or both backgrounds can often exceed action levels. Although there is a simple way to measure ambient background, it is difficult to reliably measure indoor air background. For these reasons, collection of indoor air data without evidence to indicate the potential for vapor intrusion from subsurface sources is not advised. Indoor air data should be accompanied by subslab or other types of soil gas data to verify that the pathway to indoor air is complete.

To minimize the impact of indoor air background, indoor activities such as smoking, use of sprays and solvents, paints, etc should be suspended where practical and if not should be noted during sampling. Outdoor activities that could influence indoor air levels such as mowing, painting, asphalting, etc. should also be suspended. A good discussion of background levels is contained in the OSWER Draft Guidance for Evaluating the Vapor Intrusion Pathway to Indoor Air from Soil and Groundwater (epa.gov/correctiveaction/eis/vapor.htm) and the Massachusetts Indoor Air Sampling and Evaluation Guide (Mass DEP, WSC Policy #02-430, Office of Research and Standards, Department of Environmental Protection, Boston, MA, April, 2002). Before sampling it is a good idea to read the above references. It is also a good idea to use either of the pre-sampling questionnaires contained in the these documents in order to indicate the potential for impact from background sources. Hard copies of these references and questionnaires are available from RISC and other staff. IDEM is currently working on guidance for indoor air background levels. For further information you may contact any RISC staff or anyone on the Vapor Intrusion Workgroup.

Sampling under worst case conditions is a matter of where and when one samples. Worst case samples are taken in certain locations and under certain ambient conditions. Worst case samples are generally located in the basements or areas where vapors first enter a home or building. In general, when sampling worst case conditions, it is recommend that at least three 24 hour

samples be taken; one in the basement or supporting worst case location, one in the general living area and one of general ambient background. Worst case samples should also be taken under certain ambient conditions. Below is a table from the Massachusetts Indoor Air Sampling and Evaluation Guide that will assist in determining Aworst case@ ambient sampling conditions.

Parameter	Most conservative conditions	Least conservative conditions
Season	Late winter/early spring	Summer
Temperature	IndoorB10^{o} F >than outdoors	Indoor Temp. < outdoor temp.
Wind	Steady: > approx. 5 mph	Calm
Soil	Saturated with rain	Dry
Doors/Windows	Closed	Open
Mechanical Heating Systems	Operating	Off
Mechanical fans	Off	On

The results of sampling should be evaluated using the May 2003 Draft Vapor Intrusion Action Guidelines (available on the shared drive). The May 2003 Draft Vapor Intrusion Action Guidelines are undergoing comment and review, and are subject to change. Newer versions and final guidance will also be posted on the shared drive. Numerical chronic action levels are available on the shared drive under OLQ, RISC Group, RISC 2003 Spreadsheets, Chronic Air Numbers for Distribution. Short Term Action Levels are currently available on a site by site basis and may be obtained by contacting RISC staff.